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Small-Incision Cataract Operation

CATARACT EXTRACTION with intraocular lens implantation is currently the most common surgical procedure in the United States. In the past 20 years a revolution has occurred in the techniques and technology of cataract operations. With the earlier "intracapsular" technique, the lens and capsule were removed intact through a large (10 to 14 mm) incision at the edge of the cornea. This large incision required more suturing to close, was more traumatic to the eye, and often resulted in postoperative astigmatism. When studies showed that leaving the posterior lens capsule intact would reduce the risk of postoperative macular edema and retinal detachment, most surgeons adapted an "extracapsular" technique wherein the anterior lens capsule was opened and the lens nucleus manipulated forward and removed from the eye through a large incision.

The introduction of phacoemulsification in the 1970s began a sequence of innovations that made small-incision operations possible in the late 1980s. Phacoemulsification is the process of concentrating ultrasonic energy through a hand-piece to the lens nucleus. The nucleus is fragmented into fine particles that are aspirated from the eye. The lens can be removed entirely through a 3-mm incision. To implant an intraocular lens in the eye, however, the wound still had to be extended to 6 to 7 mm.

Other innovations soon followed. Viscoelastic agents provided a clear, viscous material that could coat and protect the

corneal endothelium from the ultrasonic energy, making the cataract operation safer for the cornea. These agents also helped maintain the shape of the anterior chamber and allowed for excellent visibility during procedures. Capsulorhexis, a technique for making a controlled round or oval tear in the anterior capsule, preserved the strength and elasticity of the remaining lens capsule. This technique made phacoemulsification safer and intraocular lens placement more consistent. New methods of dissecting the lens nucleus and separating the layers of lens cortex using cannulas and irrigation were introduced, which allowed easier access to the nucleus and a greater margin of safety during phacoemulsification. Intraocular lens designs were tailored for smaller incisions. Lenses were designed to fit through a 5-mm incision; foldable silicone lenses capable of insertion through a 4-mm incision were also introduced. Wound designs were devised that are self-sealing, making "single-stitch" and "no-stitch" operations possible.

Small-incision techniques are being adapted by a growing percentage of ophthalmologists. Recent studies have shown that the main advantages of small-incision cataract operations are less trauma to ocular tissues, less immediate postoperative inflammation, less postoperative astigmatism, and more rapid visual rehabilitation.

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